UNIT 10

The Forces of Nature



In this unit, you will

- learn about alternative sources of energy.
- study renewable energy sources.
- review identifying signals of contrast.
- increase your understanding of target vocabulary words.

READING SKILL Identifying Signal Words for Comparisons

Self-Assessment

Think about how well you know each target word, and check (✓) the appropriate column. I have...

TARGET WORDS	never seen the word before	seen the word but am not sure what it means	seen the word and understand what it means	used the word, but am not sure if correctly	used the word confidently in *either* speaking *or* writing	used the word confidently in *both* speaking *and* writing
affect						
AWL approach						
AWL concept						
consume						
AWL data						
AWL derive						
AWL indicate						
obtain						
potential						
AWL source						

Outside the Reading What do you know about alternative energy? Watch the video on the student website to find out more.

AWL Academic Word List
Oxford 3000™ keywords

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READING 1

Before You Read

In small groups or with the whole class, discuss the following questions.

1. What tools or machines do you use every day that are powered by electricity?
2. How did people travel before machines were invented?
3. What are some ways that people can warm their houses during cold weather?

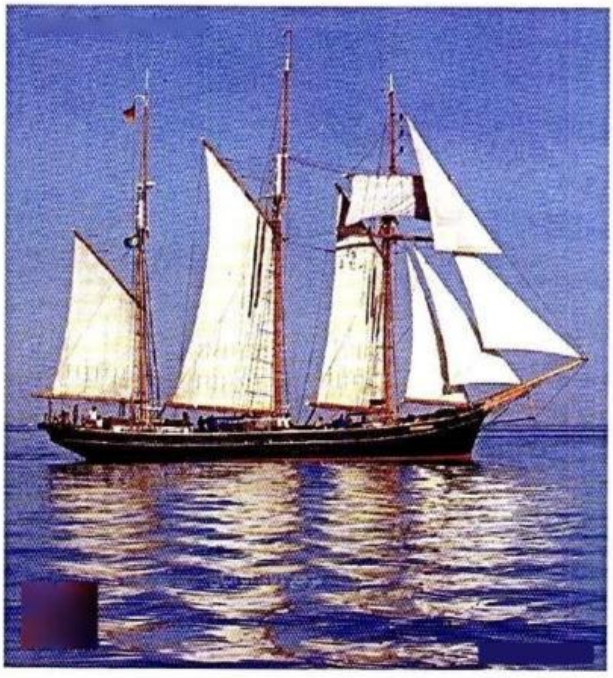
Read

The information in this article is from a technology magazine.

Sun, Wind, and Water

NATURE HELPS HUMANS

For all of human history, humans have depended on the powers of nature to help them survive. The sun warmed them and was a **source** of light. Rain filled lakes and rivers where they could **obtain** water to drink and catch fish to eat. Sun and rain combined to help plants grow. The plants became food for the humans to **consume**. The plants were also food for the animals that humans hunted. Wind blew the seeds of trees and grasses to new fields. Wind filled the sails of small boats, so humans could travel on rivers or across oceans.



With the help of wind, humans were able to travel across oceans.

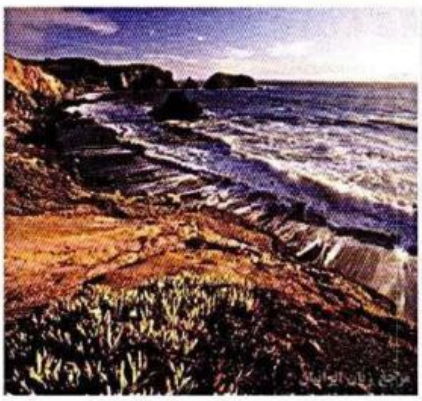
NATURE BRINGS DIFFICULTIES

However, sometimes nature did not help humans. In some years, the rain did not come. The hot sun baked the earth. Plants dried up because they had no **source** of water. Hot winds blew the soil away, so future plants could not grow. This left humans without food to eat, and they starved. In some years, too much rain fell. Homes were washed away when gentle rivers grew into **potential** killers. Often people drowned. Farm animals drowned. Towns disappeared in the flood waters.

Similarly, the ocean was often a **source** of death. Without any **indication** of danger, a giant ocean wave might suddenly sink boats. Likewise, a wave might **approach** land, where it washed away houses and drowned people. Powerful cyclones and hurricanes

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sometimes brought strong ocean winds over land. Sometimes they destroyed buildings, uprooted trees, and killed humans. The powers of nature have always **affected** human life.



Even gentle waves can quickly become dangerous.

HUMANS USE MACHINES

Then, about 200 years ago, humans learned how to create machines to help them do work. These machines needed fuel to work. Humans burned wood and coal to run the machines. They built steam engines to move ships and trains. They built automobiles and airplanes that were powered by gasoline engines. They learned how to produce electricity to light their homes. They built washing machines and telephones and refrigerators and computers. All of these machines **consumed** fuels **obtained** from the Earth.

CHANGES IN CLIMATE

As the world population grew, so did the number of machines, and so did the use of fuels to power the machines. Recent scientific **data indicate** that the Earth is warming. The sun has melted ice near the North Pole and the South Pole. The level of the oceans is rising. Cyclones and floods are happening more often. The **concept** of climate change worries humans.

Many scientists blame humans for this change in the Earth's climate. They believe that humans have not used the fuels that we **derived** from nature in a good way. They believe we should instead use natural powers to produce energy. They suggest that using sun, wind, and water to produce energy will help preserve the Earth. The sun, wind, and water are considered *renewable* energy **sources** because they will always be there.



The sun has melted ice near the North Pole and the South Pole.

Ancient humans depended on the powers of nature to help them survive. Now modern humans want to use these powers to help them survive in today's machine-based world. ■

Reading Comprehension

Mark each sentence as *T* (True) or *F* (False) according to Reading 1.

___ 1. Recent scientific data indicate that the climate of the Earth is warming.

___ 2. The machines created by humans consume fuels obtained from rivers and lakes.

___ 3. Human lives are affected by the sun, wind, and water.

___ 4. Modern humans derive most of their fuels from renewable energy sources.

___ 5. An approaching hurricane or cyclone is a potential danger to humans.

___ 6. Humans invented the concept of climate change about 200 years ago.

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READING SKILL Identifying Signal Words for Comparisons

LEARN

When writers compare two or more things, they show how the things are alike. Sometimes writers compare objects or people. Sometimes they compare places or events.

Brazil is in South America. ***So is*** *Argentina.*

Marco is ***as tall as*** *his father.*

Both *restaurants were crowded and noisy.*

Some common words and phrases that signal comparisons are listed below.

both	similarly	likewise	like..., so is...
all	too	the same as	like..., ...is too.
as... as	so is/so are	so does/did	also

APPLY

The sentences below are from Reading 1. Circle the comparison signals.

1. Similarly, the ocean was often a source of death. Without any indication of danger, a giant ocean wave might suddenly sink boats. Likewise, a wave might approach land, where it washed away houses and drowned people.
2. All of these machines consumed fuels obtained from the Earth.
3. As the world population grew, so did the number of machines, and so did the use of fuels to power the machines.

What three things grew?

_____ _____ _____

REVIEW A SKILL **Identifying Contrast Signals** (See p. 132)

There is one sentence in Paragraph 2 that shows contrast. Write the sentence below.

_____

_____

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Vocabulary Activities STEP I: Word Level

To derive something means "to get something from a certain source." It is often used to describe feelings.

*Humans **derive** many materials from animals, such as wool and leather.*

*Ming **derived** great pleasure from her flower garden.*

To derive something also means "to be taken from a related source, such as a word or substance." The passive form, with *from*, is usually used with this meaning.

*Gasoline **is derived from** oil.*

*English words **are derived from** words in many other languages.*

(See Oxford American Dictionary for learners of English, p. 196)



A. Work with a partner. Match the English word on the left with the foreign word it is *derived* from. Take turns making sentences with the information.

The English word camera ***is derived from*** *the Greek word* kamara.

1. algebra	___ a. Latin	*petr* (rock) *oleum* (oil)
2. golf	___ b. French	*obtenir*
3. canyon	___ c. Arabic	*jabara*
4. petroleum	___ d. Greek	*enérgeia*
5. obtain	___ e. Spanish	*cañon*
6. energy	___ f. Dutch	*kolf*

Data is information or facts that have been collected for a particular purpose. It is a formal word, and it is not often used in conversation.

*Now that I have the **data** I need, I can begin writing my final report.*

*Computers help businesses analyze complex **data**.*

The word *data* is the plural form of datum. However, the word datum is rarely used. A verb that agrees with the plural form is usually used only in formal or scientific writing. In nonscientific use, especially when the meaning is information stored by a computer, a singular verb is used.

*Are the **data** complete? (plural usage)*

*Is the **data** complete? (singular usage)*

(See Oxford American Dictionary for learners of English, p. 184)



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B. **Work with a partner. Match the type of *data* on the left with what that *data* might show. Take turns making sentences with the information.**

*Geological **data** show that South America and Africa were once connected.*

1. Population data	___ a. oranges are a good source of vitamin C.
2. Communication data	___ b. more people are traveling by airplane.
3. Historical data	___ c. our city received less rainfall this year than last.
4. Weather data	___ d. about 19% of the people in the world live in China.
5. Nutritional data	___ e. early humans used fire to cook foods.
6. Transportation data	___ f. nearly half of South Koreans under 40 have smart phones.

A *concept* is a basic understanding about a broad topic.

*The **concept** of climate change is explained in this textbook.*

*The manager explained her **concept** of how to make the office more efficient.*

No concept is often used to suggest that someone does not understand or know something.

*I have **no concept** of the enormous size of our solar system.*

*You have **no concept** of how hard I work.*

(See Oxford American Dictionary for learners of English, p. 148)

CORPUS

C. **Work with a partner. Match the type of people on the left with the *concept* they seem to lack. Take turns making sentences with the information.**

*People who are rich seem to have no **concept** of going to bed hungry.*

1. People who eat only fast food	___ a. time.
2. People who commit crimes	___ b. good nutrition.
3. People who are always late	___ c. danger.
4. People who drive too fast	___ d. right and wrong.

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The verb *approach* means "to come near something or someone."

I can see the bus ***approaching****.*

The profits this year ***approach*** *the company's profits from last year.*

The verb *approach* also means "to speak to someone, usually to ask for something."

He didn't want ***to approach*** *his friends for money.*

To approach something also means "to plan a way to solve a problem or to create a plan of action." The noun form is also *approach.*

The students discussed several ways ***to approach*** *the assignment.*

Each student took a different ***approach****.*

One ***approach*** *was to ask people their opinions and report the results.*

(See Oxford American Dictionary for learners of English, p. 34)



D. Imagine a professor and her students are discussing climate change. Rewrite each question or answer on a separate sheet of paper with a form of *approach*. Share your questions and answers with a partner.

1. What is the best way to solve the problem of energy shortages?
2. I'm glad that you came to me to ask for information.
3. In a few years the world population will be nearing 8 billion.
4. What plan do you recommend?
5. The best plan is developing more renewable energy sources.

To indicate something means "to show or point to something."

A sign ***indicates*** *where the restrooms are located.*

A policeman ***indicated*** *when the cars could move forward.*

To indicate something means "to give a sign that has meaning." The noun form is *indication.*

Babies cry ***to indicate*** *they are hungry.*

Babies' cries are an ***indication*** *that they are hungry.*

(See Oxford American Dictionary for learners of English, pp. 370–371)



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E. Complete this paragraph by using a form of *indicate* in each blank space.



A TV weather map

A popular feature of television news programs is a report from a weather reporter. The weather reporter (1) _____ on a large map what the temperatures were that day in local cities. Falling temperatures often (2) _____ an approaching storm. If there is an (3) _____ of rain, such as falling temperatures, he or she will (4) _____ the direction of the storm on the map. He or she uses a large calendar to (5) _____ what kind of weather to expect for the next few days. There is a picture on each day of the week. A picture of a dripping cloud (6) _____ rain, and a picture of a smiling sun (7) _____ sunshine.

F. Use the following words to complete this paragraph.

affect	concept	data	indication	potential
approached	consumed	derive	obtained	source

Throughout history, sailors have reported seeing giant waves in the ocean. Giant waves were blamed for damage to many ships. Sometimes the giant waves even caused ships to sink. Sailors had no (1) _____ of why these giant waves occurred in mid-ocean. Recently, the study of giant waves has (2) _____ the time and attention of ocean scientists. They carefully analyzed the (3) _____ that they could (4) _____ from reports of giant waves. They concluded that earthquakes are not the (5) _____ of these waves. They learned that both the size of a giant wave and its shape (6) _____ its energy. The amount of energy in a wave is an (7) _____ of its (8) _____ danger. Reports that scientists (9) _____ from sailors indicated that the waves (10) _____ very quickly. There was no time to warn other ships of the approaching wave. Scientists hope to find some way to predict the approach of a giant wave and develop a warning system.

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READING 2

Before You Read

In small groups or with the whole class, discuss the following questions.

1. What are some machines or toys that depend on wind to make them work?
2. What are some ways that individuals use heat or light from the sun in their daily activities?
3. We often say that machines help us do work. What is *work?*

Read

The information in this article is from an online technology magazine.

www.irLanguage.com

USING RENEWABLE ENERGY SOURCES

Traditional Fuels	Renewable Energy Sources
gasoline	solar
wood	wind
natural gas	ocean waves
kerosene	nuclear
coal	organic materials

Over the last 200 years, humans created many machines to help them do work. Most machines were powered by burning fuels such as coal, gasoline, and natural gas. Other machines were powered by electricity. Now scientists are suggesting that we look for ways to use natural forces to help us do work. The scientists are suggesting that we use wind, water, and the sun as **sources** of power to create electricity. Sun, wind, and water are all renewable resources. They will always be available to our growing world population.

USING WAVE POWER

The power of ocean waves as they **approach** land is very strong. For this reason, engineers believe ocean waves have great **potential** as a force to create electricity. Engineers are developing technology to use that force. One plan for a wave farm includes putting several large fiberglass tanks in the ocean and securing them to the ocean floor. The tanks would be connected to each

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other. They would float on top of the water. As powerful ocean waves **approached** land, the tanks would rise and fall with the water. The motion would spin turbines inside the tanks to generate electricity. The wave farm would be connected to shore. Engineers estimate that one tank would generate enough electricity to power one house. This **approach** would work in most areas that have a sea coast.

USING WIND POWER

A similar **concept** is now being used to create electricity using wind power. This **approach** works best in areas that have strong, steady winds. Engineers have created wind farms to collect the power of the strong winds. They put hundreds of wind machines in windy places. A wind machine is a very tall pole. At the top is a propeller with several long blades. When strong winds blow, the blades of the wind machines turn. The turning blades power machinery in nearby turbines to generate electricity. The electricity **derived** from a wind farm is then sent to nearby **consumers**.



A wind farm

USING SOLAR POWER

Another **concept** uses the sun to generate electricity. In areas that are sunny throughout the year, hundreds of collection devices are put into a large field. Each solar collection device consists of a pole with a large mirror on top. The mirrors reflect heat from the sun. The heat **obtained** from the mirrors is used to boil water. Steam from the boiling water turns machinery in a turbine to generate electricity for nearby **consumers**.



A field of solar panels

Scientific **data indicate** that generating electricity by using water, wind, and solar energy will benefit the world. However, at a local level, many people do not like these projects. They complain that wave farms destroy beautiful beaches. They also worry that a wave farm might **affect** whales and fish that swim in the water. Likewise, people complain that wind machine propellers are killing birds that fly too close to the blades. Others complain that rows of solar panels are ugly. They also say that the solar panels take up space that could be used for farming or recreation.

The choice is a difficult one. We need to consider both present and future needs when we decide how to **obtain** energy and how we **consume** it. ■

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READING COMPREHENSION

Mark each statement *T* (True) or *F* (False) according to Reading 2.

___ 1. The concept of using wave power to create electricity is possible mainly on sea coasts.

___ 2. A wind farm could affect people as well as whales and fish.

___ 3. Consumers near wind farms could obtain electrical power generated by the wind.

___ 4. Data obtained by scientists indicate that using renewable sources of energy to generate electricity will benefit the world.

___ 5. Engineers will use the potential energy of ocean waves to bring water to nearby consumers.

___ 6. Building wind farms is one approach that will use natural forces to create electricity.

___ 7. Solar panels reflect heat that is derived from the sun.

READING SKILL Identifying Signals of Comparison

APPLY Identifying Signals of Comparison

Look back in Reading 2 to find signals of comparison. Write the ones you find in these paragraphs.

1. Paragraph 1 _____
2. Paragraph 4 _____
3. Paragraph 5 _____
4. Paragraph 6 _____

REVIEW A SKILL **Identifying Contrast Signals** (See p. 132)

1. Work with a partner. What two ideas are contrasted in Paragraph 1? Have one partner read the first idea and the second partner read the other idea. What words tell you that one idea is old and another one is new?
2. What two ideas are contrasted in Paragraph 5? Have one partner read the first idea and the second partner read the other idea. What word signals the contrast?

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Vocabulary Activities STEP I: Word Level

To obtain something means "to get something." It is a formal word. People use *get* in conversations.

*You can **obtain** directions to the stores on their web sites.*

*The factory **obtained** machine parts from several sources.*

(See Oxford American Dictionary for learners of English, p. 484)

CORPUS

A. **Work with a partner. Imagine that one of you has just moved to a new city. Ask where to *obtain* things you need. Your partner will answer the questions.**

*Q: I lost the book I was reading. Where can I **obtain** a new copy?*
*A: You can **obtain** a new copy at the bookstore.*

1. I will be traveling overseas soon.	a passport	at the embassy office.
2. I don't know how to use my cell phone.	help	at the electronics store.
3. I would like to work at your company.	a job application	at the employment office.
4. I'll be buying a car next week.	a driver's license	at the Motor Vehicle office.
5. I want to move in this building.	rental information	at the manager's office

The *source* of something is where it comes from.

*My car was making an odd noise, but I couldn't find the **source** of the noise.*

*The Internet is an important **source** of information.*

(See Oxford American Dictionary for learners of English, p. 693)

CORPUS

B. **Work with a partner. Write L by the items that are *sources* of light. Write S by the items that are *sources* of sound. Write H by the items that are *sources* of heat. Some items may be *sources* of more than one thing. Take turns making sentences with the information.**

*A drum is a **source** of sound.*

___ a ship's horn	___ a radio	___ an oven	___ a candle
___ piano	___ the sun	___ thunder	___ a bell
___ a lamp	___ a voice	___ a fire	___ a stove

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Vocabulary Activities STEP II: Sentence Level

To affect someone or something means "to change or influence someone or something in some way."

*The climate in an area can **affect** what crops will grow.*

*Everyone in the school was **affected** by the new rules.*

The noun form of *affect* is *effect*.

*The new rules had an **effect** on everyone.*

(See Oxford American Dictionary for learners of English, pp. 12–13)



C. Rewrite these sentences in your notebook with a form of *affect*. Share your sentences with a partner.

1. Wave farms could harm the environment of whales and fish.
2. Using renewable energy sources will change the production of electricity.
3. A changing climate could influence the way humans live.
4. Our many machines have caused changes in how humans do work.
5. The growing world population has influenced our need for energy.

The adjective *potential* is used to describe something that is possible in the future. *Potential* can only be used in front of a noun. The adverb form is *potentially*.

*Wind farms are a **potential** danger to birds.*

*Wind farms are **potentially** dangerous to birds.*

*I've heard that our mayor is a **potential** candidate for president.*

*Our mayor is **potentially** a candidate for president.*

The noun *potential* refers to the abilities that a person or thing has, but that may not be fully developed. It is often used with the verb *have*.

*Wind farms have the **potential** to be dangerous to birds.*

*Our mayor has the **potential** to be a great president.*

(See Oxford American Dictionary for learners of English, pp. 543–544)



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D. **Rewrite these sentences on a separate sheet of paper to include the given form of *potential*. Share your sentences with a partner.**

1. Wave farms could cause harm to whales. (potentially)
2. Wave farms are a possible source for generating electricity. (potential – adjective)
3. Renewable energy could increase our supply of electricity. (potential – noun)
4. Cloudy weather can reduce the amount of energy a solar panel absorbs. (potential – noun)
5. A growing population will cause a possible increase in energy needs. (potential – adjective)

To consume something means "to use something in such a way that there is less of it."

*My car **consumes** a lot of gasoline.*

*Homework **consumes** about four hours of my time each day.*

To consume something also means "to eat something."

*Many Americans **are consuming** more fruits and vegetables.*
*They **are consuming** less meat.*

A *consumer* is a person who buys products or pays for services.

***Consumers** expect good service when they shop.*

(See Oxford American Dictionary for learners of English, p. 156)

CORPUS

E. **Read the paragraph below. Then rewrite each of the six underlined sentences to include a form of *consume*. Take turns reading all the sentences with a partner. The first one has been done for you.**

(1) Automobiles use a lot of fuel. (2) People who purchase things are demanding cheaper fuel. (3) One approach is to make a fuel from plants that people eat, such as corn. (4) However, using corn to make fuel means less corn for people to eat. Another approach is to use paper, wood pieces, and even olive seeds to make fuel. This approach uses special bacteria. (5) The bacteria eat these materials, and their bodies release oil. (6) This process is one way to give customers a cheaper fuel.

1. *Automobiles **consume** a lot of fuel.*

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F. Use the following words to complete this paragraph.

affect	concept	data	indication	potential
approach	consumers	derive	obtained	sources

Advertisements for automobiles used to stress how fast a car could go or how beautiful it was. (1) _____ buyers were expected to (2) _____ a feeling of need from the ads. Now advertisements for automobiles stress that their automobiles do not (3) _____ the environment in a bad way. Advertisements often include (4) _____ that was (5) _____ from scientific (6) _____ to show how "clean" a car is. The (7) _____ of a "clean car" is new. This new (8) _____ to selling automobiles is an (9) _____ of how (10) _____ today are concerned about the potential harm that automobiles and other machines could cause to the environment.

Writing and Discussion Topics

Discuss the following topic in small groups.

How would your life be affected if you and your family could not obtain the amount of electric power that you now use? What changes would you have to make in your daily lives? How would your city or community be different with less electricity?

Choose one of the following topics. Write six to eight sentences about the topic. Use some of the target vocabulary words.

1. Many people believe that the climate of the Earth is changing. What are some ways that life on Earth might change if the climate becomes warmer?
2. Vertical farming (Unit 9) is a way to grow food plants within a city environment. Would it be possible to have solar farms or wind farms in a big city? Why would this be a good approach to providing electricity? What are some potential problems?
3. Another way to deal with the energy shortage is to use less of it. Describe some steps that you have already taken to use less energy. What other steps could you take?

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